



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,431	10/15/2003	Gurtej S. Sandhu	M4065.0316/P316-A	3910
24998	7590	10/28/2005	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			GHYKA, ALEXANDER G	
2101 L Street, NW			ART UNIT	
Washington, DC 20037			PAPER NUMBER	
			2812	

DATE MAILED: 10/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/684,431

Applicant(s)

SANDHU ET AL.

Examiner

Alexander G. Ghyska

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 12-14, 17-22, 25-29, 32-45 and 56-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-14, 17-22, 25-29, 32-43 and 45 is/are allowed.
- 6) ☒ Claim(s) 44 and 56-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

ALEXANDER GHYKA  
PRIMARY EXAMINER

AV 2812  
*Alex Ghyska*

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_.

### **DETAILED ACTION**

Applicants' response of 8/16/2005 has been considered and entered in the record. Claims 12-14, 17-22, 25-29, 32-45 and 56-58 are now under consideration. Claims 12-14, 17-22, 25-29, 32-43 and 45 are allowable for the reasons as discussed below. With respect to Claims 44 and 56-58, Applicants' arguments have been considered, but are not persuasive for the reasons as discussed below.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 44 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai (US Patent No. 5,981, 398) in view of Fiordalice et al (US 5,534,462), Tanaka et al (US 5,733,712) and Miller (US Patent No. 4,722,913) .**

Tsai discloses a method for forming a patterned layer in microelectronic fabrication. Blanket target layer 12 is formed on substrate 10. Blanket silicon oxide layer 13 is formed over layer 12 and serves as an antireflective coating. The ARC layer is preferably formed from about 300-1000 angstroms (column 6, lines 30-44). Blanket hard mask layer 14 is then formed over ARC layer 13. Hard mask layer 14 is preferably formed from a sisequioxane spin-on-glass (SOG) material (the claimed layer which is

Art Unit: 2812

transparent to the wavelength of light ) at a thickness of about 2000-4000 angstroms (column 7, lines 23-26). Therefore, the layer of the thickness of the transparent layer is greater than the thickness of the ARC layer, as required in the present limitations of Claims 56. Patterned photoresist layers 16a, 16b and 16c are formed preferably using DUV light (248 nm) and then used as an etch mark to pattern the underlying layers (column 8, 10-44). Tsai et al disclose that the ARC layer has a smaller thickness than the transparent layer on it as required by the amended claims. With respect to the limitations in Claim 44, two sublayers of silicon as required by the present claims do not patentably differentiate over one layer of silicon as disclosed by the Tsai reference.

However Tsai does not disclose using BPSG, PSG or TEOS as the transparent layer or providing a silicon oxide layer over a surface of the substrate.

Fiordalice teaches that plasma enhanced oxide, BPSG, PSG, TEOS and SOG are all known silicon oxide based dielectric equivalents conventionally used in the art for interlayer dielectric materials. See column 1, lines 42-45 and column 4, lines 27-29.

Tanaka et al disclose a resist pattern forming method using an antireflective layer. Tanaka et al is simply relied upon to show that SOG and PSG layers are transparent to light having a wavelength of 248 and 365 nm. See column 11, lines 28-33, column 12, lines 18-25, column 20, lines 30-35, column 22, lines 30-35.

Therefore, it would have been obvious to one of ordinary skill in the art to use BPSG, PSG or TEOS as the transparent layer in the method of Tsai, instead of the SOG as taught by Tsai, because Fiordalice teaches that all are silicon oxide based equivalents which are conventionally used as interlayer dielectric materials. The

Art Unit: 2812

transparency of these layers would be obvious in view of the teaching of the Tanaka et al reference.

While Tsai does not disclose that a silicon oxide layer is provided over a surface of the substrate, the reference does teach that the substrate may have formed thereon additional microelectronics layers which are conventional in the art, such as microelectronic dielectric layers (column 5, lines 19-45). Miller teaches that it is conventional in the art to provide an insulating film over a semiconductor substrate in order to insulate the substrate devices from the overlying metal layers and that typically this insulating layer is silicon oxide (column 1, lines 56-63).

Therefore, it would have been obvious to one of ordinary skill in the art to provide a silicon oxide layer (as a microelectronics dielectric layer) over the substrate in the method of Tsai because Miller teaches that it is known in the art to provide an insulating layer of silicon oxide over a substrate for the benefit of insulating the substrate and its devices from the overlying metal layers.

**Claims 57-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Fiordalice, Tanaka and Miller as applied to claim 44 and 56 above, and further in view of Applicants' Own Admission in the Present Specification.**

Tsai, Fiordalice, Tanaka and Miller are relied upon as discussed above.

Tsai discloses exposing the photoresist to DUV (248 nm) but does not disclose exposing the photoresist to light at a wavelength of 193 or 365 nm.

Applicants' own specification teaches that in addition to DUV (248 nm), mid-UV (365 nm) and extreme UV (193 nm) are also conventional radiation sources used in the art (See Background Section of the present Specification).

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to expose the photoresist in the method of Tsai in view of Fiordalice, Tanaka and Miller to light at a wavelength of 193 nm or 365 nm, instead of 248 nm, for their known benefit as conventional radiation sources used to expose photoresist in the art as disclosed by Applicants' own specification. Therefore, a *prima facie* case of obviousness is established.

### ***Response to Applicants' Arguments***

Applicants' argue that layer 12 of Tsai is a polycide. The Examiner maintains that layer 13 is an oxide, as required by the afore mentioned claims, and as the present claims require an oxide "over" the substrate, the present claims read on the Tsai reference.

### ***Allowable Subject Matter***

Claims 12-14, 17-22, 25-29, 32-43 and 45 are allowed.

The cited prior art does not anticipate or make obvious an oxide formed over said substrate; a layer that is transparent to light formed over said substrate and having a first thickness, wherein said transparent layer includes a material selected from a group consisting of BPSG, PSG and TEOS; and a first anti reflective coating formed beneath

Art Unit: 2812

the transparent layer and on said oxide layer and having a second thickness, wherein said first thickness is greater than the second thickness. Moreover, the cited prior art does not anticipate or make obvious an oxide formed over said substrate; a layer that is transparent to light formed over said substrate and having a wavelength of approximately 365 nm or 193 nm, wherein said transparent layer includes a material selected from a group consisting of BPSG, PSG and TEOS; and a first anti reflective coating formed beneath the transparent layer and on said oxide layer

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander G. Ghyka whose telephone number is (571) 272-1669. The examiner can normally be reached on Monday through Thursday during general business hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AGG  
October 27, 2005

ALEXANDER GHYKA  
PRIMARY EXAMINER

AV 2812  
